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(54) **Light assembly.**

(57) A vehicular rearview mirror and light assembly (10; 170) which provides map and or courtesy lighting for the vehicle interior. One or more separate housings (40; 172, 174) are removably secured to the back (16; 16') of the mirror case (15; 15') and support one or more light assemblies within the space interior of the mirror case (x) through one or more light sources (98; 98'). A reflector/heat sink (100; 200, 202) and/or a light directing lens (150) are optionally included. Preferably, when mounted in typical rearview mirror position adjacent a windshield, light is directed downwardly and laterally outwardly of either end of the assembly, toward the driver and front seat passenger and laterally inwardly toward the centre or console area between the driver and passenger. Lighting of the instrument panel and glare in the driver's eyes are avoided or minimized.

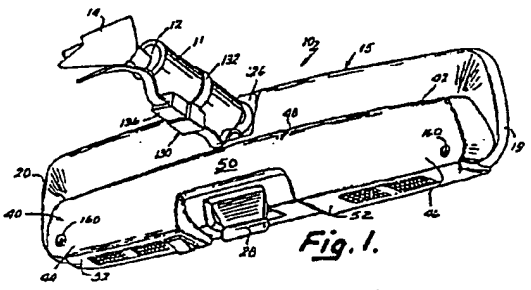

Fig. 1.

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LIGHT ASSEMBLY

This invention relates to rearview mirror assemblies for vehicles and, more particularly, to rearview mirror assemblies in which light sources are provided for illumination of inteiror portions of the vehicle in which the assembly is mounted.

Vehicles with conventional, permanent tops or roofs can easily provide interior map and/or courtesy lighting from the roof area via dome lights or the like which shine downwardly and forwardly or rearwardly over the shoulders of the driver or passengers to enable the reading of maps, books of the like, as well as to light the interior when entering the vehicle. However, in vehicles with removable tops including convertibles, off-road vehicles, or vehicles having removable sunroofs, the conventional practice of providing interior lighting from the roof area of the vehicle interior is difficult or impossible to accomodate.

One solution to interior lighting in such vehicles is to provide lighting from the typical rearview mirror location at the windshield header in the vehicle. Lighted rearview mirror assemblies such as those shown in CA-A-551,492 and in U.S.-A-3,543,018 have been devised previously to provide interior lighting from such vehicle areas. In CA-A-551,492, a hollow box-like structure

is described having a rearwardly facing mirror glass supported adjacent a pair of light bulbs mounted within the interior of the box. The generated light shines downwardly through a translucent panel fitted along the bottom of the box or housing.

In U.S.-A-3,543,018, a single light bulb is positioned in a laterally shiftable manner within a metallic mirror case through the bottom of the case. The case conducts electricity and serves as a ground connection to complete the circuit through the bulb. A lens supported beneath the bulb on the shiftable support holding the bulb directs light downwardly when the shiftable support is moved into contact with the metallic mirror housing.

While such prior structures have provided a certain amount of light from the rearview mirror area, they do encompass a number of drawbacks. For example, the prior structures have tended to generate a great deal of heat from the light bulbs therewithin during use. That heat is transferred to the surrounding case creating hot spots on the case which can burn an unwary user of the light. Moreover, the quantity of light and the positioning of and direction of the light for use by either the driver of passengers within the car has been less than adequate with such structures. In addition, because of the

weight of the metallic cases and the bulky light supporting structures in such prior structures, the overall weight of such assemblies has been relatively high. These factors contribute to a significant amount of viration when the assemblies are in use in vehicles. The vibration reduces visibility in the mirror element in the assembly. Such reduced visibility can be a significant safety hazard to proper use of the reaview mirror which is the principal function of such assemblies.

A further problem encountered with prior structures of this type has been the leakage or misdirection of light toward the front of the vehicle in which the rearview mirror assembly is mounted. This causes illumination of instrument panel areas of the vehicle or other undesired areas. In addition, such structures have been prone to light leakage visible to the driver or passengers which, when coupled with illumination of undesired areas of the vehicle, can serve as a significant distraction to the driver or passenger thereby also creating a safety hazard.

In addition to the heat, light direction, vibration and light leakage problems mentioned above, prior structures of this type have been difficult to design in a compact, aesthetic and useful manner which avoids unnecessary bulk which can create a vision hazard to the driver or passengers of a vehicle.

Although a certain amount of light is provided from other types of structures such as lighted vanity mirror incorporated in more recent vehicles manufactured

in the U.S. and elsewhere, lighted vanity mirrors do not provide a solution to the problem of general interior and/or courtesy lighting for use for reading by the driver or passengers or the provision of courtesy lighting during entrance into the vehicle since they are primarily directed to illuminating the face of a person using the vanity mirror. Accordingly, lighted vanity mirrors do not provide a solution to the interior lighting problems mentioned above.

According to a first aspect of the present invention a rearview mirror vehicle lighting assembly comprises a mirror case for a mirror and means for supporting the assembly in a vehicle, the case having a front opening through which the mirror element is visible; and a light source; characterised in that the case back comprises an opening therethrough; the bottom edge of the case comprises an opening therethrough; and the assembly includes closure means for covering the opening through the case back and housing means for supporting the light source within the case in a position to provide light shining downwardly and out the bottom edge of the case.

Preferably the closure means is a housing secured on the case back, the housing being hollow, having a rear wall spaced from the

case back, and tightly ngaging the exterior of the miror case around the periphery of the openings in the case back and bottom edge to prevent light leakage therebetween. A light directing means is preferably included.

According to a second aspect of the present invention a rearview mirror vehicle lighting assembly comprises lighting means for illuminating areas adjacent the assembly; and a mirror case with a back for a mirror characterised by the case back being spaced from the mirror element and having at least one opening therethrough into the space between the mirror element and the case back; housing means secured on the exterior of the mirror case for supporting the lighting means within the space through the opening in the case back, the housing means including closure means for covering the opening in the case back; and light directing means for directing the light from the lighting means outwardly of the assembly.

The light directing means in either aspect of the present invention is preferably in the form of a lens positioned beneath the light source, and reflector means extending around the light source for reflecting light therefrom downwardly toward the lens. The reflector means is preferably a metal housing which

reflects light from the light source and also serves as a heat sink to dissipate heat from the light source and comprises means engaging the housing means preventing shifting of the reflector means when positioned in the assembly.

In a preferred embodiment the case back comprises a pair of openings therethrough, one on either side of the centre of the case back; the housing means comprising means for supporting lighting means within both the openings and closure means for covering both the openings. Preferably light directing means are included comprising means for directing light from the lighting means downwardly of the assembly, toward the side of the assembly comprising the mirror laterally outwardly of the ends of the assembly and laterally inwardly toward a plane extending through the centre of the assembly, the light directing means causing illumination of a first magnitude of first and second areas below and adjacent either lateral end of the assembly and on the one side of the assembly comprising the mirror, and illumination of a second and greater magnitude than the first magnitude of a third area intermediate the first and second areas and on the one side of the assembly, but minimizing illumination of areas on the side of the case back which is opposite the one side.

In a third aspect of the present invention a rearview mirror vehicle lighting assembly comprises a mirror case for a mirror, a case back, lateral ends, and means for supporting the assembly in a vehicle; lighting means for illuminating areas adjacent the assembly; characterised by support means for supporting the lighting means on the mirror case; and light directing means for directing light from the lighting means to illuminate first and second areas below, adjacent either lateral end, and on the one side of the assembly on which the mirror element is located with a first amount of light, and a third area intermediate the first and second areas and aligned centrally of and on the one side of the assembly with a second amount of light which is greater than the first amount, the light directing means generally minimizing illumination of areas on the side opposite the one side of the assembly where the case back is located. Preferably the light directing means comprises means for directing a greater amount of light in the first, second and third areas in a position spaced outwardly away from the one side of the assembly than in a direction directly downwardly from the assembly. The third aspect of the present invention may be combined with either the first or second

aspect of the present invention. Similarly the compatible features of the first and second aspects of the present invention may be combined and similarly all three aspects of the present invention may be combined.

In any of the above aspects of the invention or combinations of the invention one or more of the following preferred features may be present:-

- connection means for electrically connecting the light source to a source of electrical energy;

- the reflector means comprising a metal housing extending around the lighting means and opening downwardly toward the bottom edge of the mirror case, the metal housing also providing a heat sink for dissipation of heat from the lighting means;

- the light directing means comprising at least one opening in the bottom edge of the mirror case; preferably the opening in the bottom edge of the mirror case communicates with the opening in the case back;

- the light directing means comprising reflector means supported on the housing means for reflecting light from the lighting means;

- the light directing means comprising a lens for directing light from the light means downwardly of and toward one side of the assembly; preferably the lens comprises optical surfaces for directing light from the lighting means downwardly of and toward the side of the assembly on which the mirror is located; and more preferably the optical surfaces of

the lens direct light from the lighting means laterally outwardly toward both ends of, as well as toward a plane extending through the centre of, the assembly;

- the housing means comprising the lens which is supported beneath the lighting means and the reflector means;

- the lens is generally planar;

- the lighting means comprising an elongated light source extending generally parallel to the plane of the lens;

- the light directing means comprising at least one opening in a downwardly facing surface of the housing means, preferably the opening in the housing means being segmented into smaller sections;

- the housing means comprising means for removabl- securing the housing means to the mirror case;

- the mirror case comprising an opening in the bottom edge communicating with the opening in the case back; the housing means extending continuously along the case back and around the bottom case edge and contoured to the shape of the mirror case such that the housing means completely covers the opening; the means for removably securing the housing means comprising retaining means for holding the housing means tightly in contact with the case back and case edges around the openings to prevent light leakage through the areas between the housing means and the mirror case;

- the mirror case and the housing means being moulded from resinous materials having low electrical

and heat conductivity, the housing means preferably being moulded from a resinous material having a higher temperature resistivity and melting point than the resinous material of the mirror case;

- the light directing means comprising a lens received in the housing means, the lens preferably being moulded from a resinous material having a higher temperature resistivity and melting point than the resinous material of the mirror case;

- the housing means comprising a portion connecting the closure means for covering the opening or openings in the case back, the connecting portion being hollow and spaced from the case back;

the housing means comprising means for preventing light leakage at the areas at which the housing means contacts the mirror case;

- the lighting means comprising a plurality, such as a pair, of light sources preferably together with associated electrical connection means extending through the housing means and connecting portion thereof for connecting the light sources to an electrical source; the light directing means comprising a plurality of lenses, such as a pair of lenses, one lens aligned with each of the light sources and reflector means surrounding the light sources for reflecting light from the light sources through the lenses.

In recognition of and as a solution for the above noted problems, the present invention provides a compact, rearview/mirror lighting arrangement

which provides at least in the preferred embodiments proper and sufficient amount of light for both the driver and front seat passenger of a vehicle and a somewhat greater amount of light for the centre or console area between the drive and passenger in the seating area of the vehicle. At the same time, the present invention minimizes illumination of undesired areas such as the crash pad on top of the instrument panel of the vehicle, substantially avoids illumination panel, while preventing light leakage which can distract the driver or passengers. Also, the light source or sources in the present assembly are not directly visible to the driver or passenger.

In addition, the present invention provides, at least in the preferred embodiments, proper heat dissipation for any heat build up from use of the light in the assembly, avoids hot spots in the assembly which could burn or injure users of the assembly, and yet has minimal weight and even, uniform mass distribution which avoids significant vibration which could otherwise detract from proper vision and use of the rearview mirro vehicle lighting assembly. The present preferred rearview mirror vehicle lighting assembly also includes an appropriate lighting structure without affecting the appearance of the mirror assembly when viewed by the driver or passenger and does not affect the connection or support of the mirror assembly on the vehicle in its normal position. Further, attachment and access to the lighting assembly may be provided

through the back of the associated mirror case for repair and/or maintenance while avoiding obstruction of the desired lighting from the bottom of the assembly.

In one form of the invention, a rearview mirror vehicle lighting assembly is provided including a mirror case having a back, top, bottom and end edges and including a mirror element. The case back is spaced from the mirror element and has at least one opening through the case back into the space between the mirror element and case back. Means for supporting the assembly on a vehicle are also provided. In addition, lighting means for illuminating areas adjacent the assembly and housing means secured on the exterior of the mirro case for supporting the lighting means within the space through the opening in the case back are included. The housing means also include a closure means for covering the opening in the case back. Further, light directing means for directing light from the lighting means outwardly of the assembly are provided.

In another form of the invention, housing or cover members are included over one or more openings in the back of the mirror case. The housing or cover members support lights or light sources shining directly downwardly through openings in the bottom of the housing or cover members.

In specific forms of the invention, the light directing means may include reflector housings for directing light downwardly through lenses supported

beneath one or more light sources mounted in the housing means. Such lenses provided the important feature of adequate and proper lighting for both the driver and passenger areas of the front vehicle seating area by directing light downwardly and toward the side of the assembly on which the mirror element is located while, at the same time, directing light laterally outwardly toward both ends of the assembly and laterally inwardly toward a line passing through the centre of the assembly. Such light direction creates various zones of specific light intensity for the driver and passenger. The centre or console area between the driver and passenger is provided with a greater amount of light while illumination of the crash pad area is minimized and illumination of the instrument panel areas of the vehicle is substantially avoided.

In other specific forms of the invention, the assembly includes appropriate wiring extending through the housing secured on the back of the mirror case for connection to an electrical source in the vehicle, appropriate switching to control the operation of the lighting assembly, and means for preventing light leakage between the housing and mirror case to avoid distracting light. Preferably, the housing is easily removable for access and repair purposes.

The invention may be put into practice in various ways but two mirror and light assemblies will now be described by way of example with

reference to the accompanying drawings, in which:

Figure 1 is a rear perspective view of a rear-view mirror/vehicle lighting assembly;

Figure 2 is an end elevation of the assembly shown in Figure 1;

Figure 3 is a rear elevation of the assembly shown in Figures 1 and 2;

Figure 4 is a bottom plan view of the assembly shown in Figures 1 to 3;

Figure 5 is a rear elevation of the rearview mirror assembly of Figures 1 to 4 with the lighting assembly and lens housing removed therefrom to illustrate the openings through the back of the mirror case for receiving the lighting assembly;

Figure 6 is a sectional end elevation taken along plane VI-VI of Figure 5;

Figure 7 is an elevation of the interior of the lighting assembly and lens housing shown separated from the rearview mirror assembly and adapted for attachment to a housing such as that shown in Figure 5;

Figure 8 is a broken elevation of a portion of the lens housing shown in Figure 7 with the lighting apparatus removed;

Figure 9 is a sectional end elevation of the lens housing taken along plane IX-IX of Figure 8;

Figure 10 is a broken plan view of a portion of the lens housing showing a lens opening therein taken along plane X-X of Figure 8;

Figure 11 is a broken sectional view of the lens

opening in the lens housing taken along plane XI-XI of Figure 10;

Figure 12 is a broken sectional view of the lens opening and reflector supporting ribs in the lens housing taken along plane XII-XII of Figure 10;

Figure 13 is a side elevation of one of the reflector housings of the present assembly;

Figure 14 is an end elevation of the reflector housing of Figure 13;

Figure 15 is a bottom plan view of one of the lenses of the present assembly;

Figure 16 is a top plan view of the lens of Figure 15;

Figure 17 is a sectional side elevation of the lens taken along plane XVII-XVII of Figure 15;

Figure 18 is a sectional end elevation of the lens taken along plane XVIII-XVIII of Figure 16;

Figure 19 is a schematic diagram of the electrical circuit of the present assembly;

Figure 20 is a schematic diagram of the dimensions of one of the prism or optical surface sections on the lens of the present assembly;

Figure 21 is a schematic diagram of the illuminated areas created with the rearview mirror/vehicle lighting assembly of Figures 1 to 20;

Figure 22 is a further schematic illustration of the illuminated areas created with the rearview mirror/vehicle lighting assembly of Figures 1 to 20;

Figure 23 is a rear perspective view of a second embodiment of rearview mirror/vehicle

lighting assembly;

Figure 24 is a sectional end elevation of the assembly of the second embodiment of the assembly taken along plane XXIV-XXIV of Figure 23;

Figure 25 is an elevation of the second assembly embodiment showing the interior thereof taken along plane XXV-XXV of Figure 24; and

Figure 26 is a fragmented sectional view taken along plane XXVI-XXVI of Figure 25, showing an attaching tab for the housing.

Referring now to the drawings in greater detail, two embodiments of the present rearview mirror/vehicle lighting assembly are shown, namely, embodiment 10 in Figures 1 to 22 and embodiment 170 of Figures 23 to 28. In each embodiment, a rearview mirror assembly for use in vehicle such as automobiles or trucks or the like is coupled with a lighting assembly such that the combined assembly cooperates to produce a lightweight, optically efficient, rearview mirror assembly with minimal vibration while simultaneously providing the capability of reading or map and/or coutesy lighting within a vehicle from the rearview mirror location while minimizing illumination of undesired portions of the vehicle interior such as the crash pad over an instrument panel while substantially avoiding illuminatioan of the instrument panel itself. Such illumination is also provided without distracting light leakage into the eyes of the driver or areas other than the desired lighting areas.

Generally, each embodiment of the invention includes a rearview mirror and mounting bracket assembly of the type designed for day/night operation in which the intensity of reflected light may be reduced to eliminate glare during night driving. The day/night rearview mirror assembly used for both embodiments is of the type shown and described in U.S.-A-4,436,371. That day/night vehicle mirror assembly includes a mounting bracket 11 which is of a known type including a pair of ball joints 12, 13 (Figure 2) received within a cylindrical casing. The ball member 12 is connected to a casting or support member 14 adapted for receipt over a retainer or button mounted on the inside surface of a windshield to support the rearview mirror assembly in viewing position. The double ball joint mounting bracket allows pivotal adjustment of the position of the mirror to accommodate drivers of all sizes and enables adjustment of the positioning of the lighted areas obtained with the rearview mirror/vehicle lighting assembly of the present invention.

The mirror assembly also includes a moulded, one-piece, resinous plastics case 15 having a mirror element 24 (Figure 6) and an overcentre, toggle type, day/night pivot actuator 26 which pivots the mirror case and mirror element with respect to the mirror mounting bracket 11 between precisely located day and night reflecting positions. A preferred material for the case 15 and actuator 26 is polypropylene. The mirror element 24 is spaced from the

back 16 of the moulded, resinous mirror case 15 to provide an internal area or space which, in the present invention, is utilized for receipt of the lighting assembly. That space also reduces the weight of the overall rearview mirror/vehicle lighting assembly. In addition to the case back 16, the mirror case 15 includes a continuous, peripheral side wall forming top, bottom and lateral end edges 17 to 20 (Figures 1 to 6). These edges end in a continuous moulded lip 23 (Figure 6) on the side of the mirror case 15 opposite the case back 16 and define an opening which receives the mirror element 24. The day/night actuator 26 is received within the space between the mirror element 24 and the case back 16 on support members as described in U.S.-A-4,436,371 for actuation by a pivot member 28 between day and night positions. The pivot member 28 projects downwardly through an opening extending through the case back 16 and the bottom edge 18 in a central position on the mirror assembly (Figures 1 and 3 to 5).

As is best seen in Figure 5, the case back 16 also includes a pair of generally rectangular cut-outs or openings 30 extending through the back of the case laterally intermediate the pivot member 28 and either lateral end 19, 20 of the mirror assembly. The openings 30 extend continuously into and communicate with openings 32 extending through the bottom edge 18 of the mirror case in alignment with the openings 30 (Figure 6). The combined openings 30,

32 receive portions of a lighting assembly 40 when secured to the exterior of the back 16 as described more fully hereinafter.

Referring now to Figures 2 to 4 and 7, the lighting assembly 40 which is adapted for coupling to the back of the mirror case 15, includes a lens housing 42 having lighting support portions 44, 46 and a connecting portion 48 of lesser width than the portions 44, 46 extending between the inner surfaces of the lighting support portions 44, 46. The entire lens housing 42 is preferably moulded in one-piece from a resinous, thermoplastic material such as polycarbonate. The preferred colour for the polypropylene and polycarbonate materials used to manufacture the mirror case, actuator and lens housing is black so as to reduce reflected light from the case and lens housing and thus reduce glare to the driver of a vehicle in which the assembly is mounted. However, other coloured materials such as those keyed to the vehicle interior colour can also be used. Polycarbonate resinous material is preferably used for the lens housing 40 since it has a higher heat deflection temperature and thus a higher heat resistance which can better withstand the temperatures generated by the light sources mounted within the present invention. The mirror case 15 need not be formed from polycarbonate because the mirror case portions adjacent the lighting assemblies are spaced sufficiently away to avoid such heat problems and are also protected by

reflector heat sink housings 100 extending around light sources 98 as described below. The heat deflection temperature of the preferred polypropylene (4 E 31A from Eastman Chemical Products Inc.) is 79°C at 455 kPa (175 degrees F. at 66 psi) and 57°C at 1820 kPa (134 degrees F. at 264 psi) under ASTM Test D648. The heat deflection temperature for the preferred polycarbonate is 138°C at 455 kPa (280 degrees F. at 66 psi) and 129°C - 138°C at 1820 kPa (265-280 degrees F. at 264 psi) under the same ASTM test. The maximum temperature expected to be encountered with this assembly, even when lighted for extended periods, is about 37.7°C (100 degrees F.) above the ambient temperature of the mirror location.

Referring now to Figures 2 and 9, the lens housing 42 is generally hollow and U-shaped in cross-section, and has a generally vertically extending back 50 and a generally horizontally extending bottom edge 52 when mounted on the mirror case 15. A continuous end edge 54 (Figures 7 and 9) extends around the top and ends of the lens housing 40 at the end of an in-turned flange at the top and ends of the back 50. The continuous edge 54 is contoured to the shape of the back 16 of the mirror case 15 such that it tightly abuts the case back 16 around the periphery of the cutouts 30, 32 to effectively seal and prevent light leakage from within the case when the light sources are actuated. A free end edge 70 of the bottom wall 52 extends beyond and overlaps the edge of the opening 32 as

explained below and as shown in Figure 12. Such tight engagement and overlap is made effective by the removable securing structure for fastening the lens housing 42 to the back of the mirror case as is also described below. The hollow interior of the lens housing 42 within the border provided by the edges 54, 70 provides a space for mounting and supporting the lighting assemblies which are received in the cutouts 30, 32 as well as a space for receiving the wires, switches and electrical connectors which provide electrical power to the lighting assemblies. Such wiring and components are thus concealed from view from the assembly exterior as well as being effectively confined by the lens housing against the case back 16.

In each of the bottom walls 52 of the lighting support portions 44, 46 is provided a rectangular lens opening 56 best seen in Figures 10 to 12. A recess 58 is provided around generally the entire periphery of the lens opening 56 except for a locating tab or detent 60 at the inner end of each rectangular lens opening. The locating tab 60 positions a lens element 150 (Figure 15) which is designed to include specific optical surfaces to direct light in a predetermined manner when received in the lens opening 56 and surrounding recess 58. Arranged at spaced intervals along the longer sides of the lens openings are stiffening supports ribs 64a and b, 66a and b and 68a and b (Figure 10). The ribs 64b, 66b and 68b are interconnected by and

are formed on top of an upstanding wall 65 which parallels the edge of the opening 56 and extends slightly inside that edge (Figure 12). The ribs 64, 66, 68 and the wall 65 include projecting end or vertical surfaces 64c, 66c, 68c, and 65a which extend slightly inside the outline of the rectangular lens opening (Figures 11 and 12). Those projecting end surfaces and the wall 65 terminate above the level of the inside surface of the bottom wall 52 of the lighting support portions surrounding the lens opening 56 to provide a small gap or space "X" (Figure 12). The gap "X" on both of the longer sides of the opening 56 receives a thin flange from one of the reflector housings 100 to hold that reflector housing in place aswill be more fully described hereinafter. In order to prevent longitudinal shifting of the reflector housing, one of the rib ends, preferably the rib end 64c, is slightly longer than the other rib ends 66c, 68c or face 65a of the wall 65 such that it may project into a corresponding slot in the reflector housing as is also described below. The ribs 64a, 66a and 68a extend toward the vertical back wall 50 of the lens housing 42 from the edge of the lens opening and merge into that rear wall to provide a bracing structure which rigidifies the entire lens housing.

At the outer ends of the ribs 64b, 66b and 68b, outwardly projecting flanges 64e, 66e and 68e extend beyond a vertical outside face 67 of the wall 65 (Figure 12). The outer edge 70 of the bottom wall

52 of the lens housing projects beyond the vertical face 67, and has a rounded contour visible from the front of the overall rearview mirror/vehicle lighting assembly when complete. Accordingly, when the lens housing 42 is fitted against the back of the mirror case 16 as in Figure 12, the lower edge of the opening 32 is received between the projecting rib portions 64e, 66e and 68e and the projecting bottom wall edge 70 and against the vertical face 67 of the wall 65 in a tongue and groove fashion to firmly lock the lens housing lower edge in position with respect to the lower edges of the openings 32 to both prevent light leakage and to firmly retain the light assemblies in place.

As is best seen in Figures 4, 7 and 9, a lighting assembly or support is mounted immediately above each lens opening 56 in each lighting support portion 44, 46 of the lens housing 42. The lighting assemblies each include a lamp or bulb socket 80 riveted to a steel retainer bracket 82 which is preferably formed from steel and plated with cadmium or zinc for corrosion protection. The bracket 82 includes a base 84 having an aperture therethrough adapted to receive an extending stake or post 86 moulded on the interior of the lens housing 42 in position to receive the bracket base 84. The stake or post 86 is heat formed to create a head which retains the bracket in place. Alternatively, instead of the stake or post 86, a screw can be received through the base 84 and sunk into the

vertically extending back of the lens housing 42 to retain the bracket in place. Also included is a secondary post 86 positioned in a second aperture or an extension of the main aperture through the base 84 to properly align and vertically position the bracket 82 within the lens housing.

The bracket 82 also includes an upper retaining flange 90 which is angled toward the edge 54 of the upper flange of the lens housing such that a space slightly less than the thickness of the back 16 of the mirror case 15 is created. An upper edge 92 of the flange 90 is curved away from the edge 54 to allow the flange 90 to spring outwardly to receive the upper edge of the opening 30 when the lens housing is assembled with the case back 16. The lower portion of the bracket 82 includes an L-shaped extension 94, 96. The bulb socket or base 80 is riveted to the downwardly extending portion 96 as shown in Figure 9.

Preferably, received within each of the lamp bases 80 is a light source in the form of a conventional 3 candle power incandescent light bul 98 of known structure, although other power bulbs could be used. The end of such bulb is preferably of wedge base style to be received within spring clips in the lamp base 80, although screw-in, bayonet or other type bulbs and compatible lamp bases may also be used. When positioned within the lamp base 80, the bulb 98 is positioned directly over and generally parallel to the plane of the lens opening 56 and the

lens 150 when received therein. Thus, the optical surfaces of the lens can properly orient the light and direct it downwardly and outwardly of the assembly.

Positioned over and around each of the lamp bases 80 and bulbs 98 is a reflector housing 100 preferably stamped from low carbon sheet steel and plated with tin for corrosion protection and to provide a relatively shiny, light reflective surface, at least on the inside surface thereof. The reflector housings 100, which are mirror images of one another, are best seen in Figures 7, 13 and 14. Each reflector housing 100 includes a pair of slightly tapering side walls 102, 104 and a closed end wall 106 which slants inwardly as it progresses toward the rounded top surface 108. The end opposite the closed end wall 106 is open and is adapted to receive the bulb and bulb base when the housing is slid thereover and secured by the ribs 64, 66 and 68 adjacent the lens opening 56. The side wall 102 of the reflector housing 100 also includes a vertically extending slot 110 adapted to receive the extending rib 64c to position the reflector housing against lateral shifting, as well as an outwardly extending lower flange 112 which fits within the space "X" below the rib extensions 64c and d, 66c and d, and 68c and d. A rectangular recess or cutout 114 is also provided adjacent the open end of the housing 100 to allow receipt of the bulb base 80 when the housing is slid thereover as shown in

Figure 7. When the reflector housing 100 is positioned as shown in phantom in Figure 12, the bulb 98 is centred within the housing. Light from the bulb is reflected downwardly by the housing through its open lower side which is, as shown in Figures 7 and 12, positioned immediately above the lens 150 when positioned in the lens opening 56. Thus, substantially all of the light from the relatively low power (3 candle power) bulb 98 is directed downwardly and outwardly of the assembly. Such low power directed lighting keeps heat build-up to a minimum while providing fully adequate illumination. The sides 102, 104 of the reflector housings 100 are relatively thin and may be squeezed inwardly to allow the flange 112 to be slid under the retaining ribs 64, 66, 68 until the slot 102 is in registry with the extension of the rib 64 at which point pressure on the sides is released and they spring outwardly into proper position with the cutout 114 fitted around the bulb base 80 and the slot 102 received around the rib extension 64c to prevent lateral shifting.

In addition to the light directing function provided by the reflector housings 100, the housings 100 also serve as heat sinks within the lighting assembly to receive or collect and dissipate heat within the assembly to prevent hot spots on the lens housing 42 or any part of the rearview mirror assembly 15. Sheet metal housings 100 have a high heat conductivity and readily absorb heat generated

by the light bulbs 98 which are in close proximity thereto. Accordingly, melting of any part of the lens housing or the rearview mirror assembly or any backing on the mirror element itself is avoided through such heat dissipation which also provides greater life for the assembly.

As shown in Figure 19, a wiring assembly 115 provides electrical power to each of the light bulbs 98 and allows appropriate switching of such power when desired. A switch 120, which may be one of any of several conventional varieties, is preferably a rocker-type, double pole switch obtained under Part No. 62116229 from Carlingswitch, Inc. of West Hartford, Connecticut. The switch 120 is positioned adjacent one of the lighting assemblies within one of the lighting support portions 44, 46 of the lens housing 42 through an opening in the bottom wall 52 as shown in Figure 7. It includes a rocker element enabling it to be opened or closed from beneath the lighting assembly and a pair of spring retainer arms which engage the inside surface of the bottom wall 52 of the lens housing 42 after the switch is pressed through the opening therein to hold it tightly in place (Figure 7).

The wiring assembly 115 also includes a female plug assembly 130 having a plug retainer clip 132 formed from resinous plastics material receiving and holding a female plug 134 with three electrical terminals adapted to receive a male plug 136 (Figure 1) from a vehicle power source. The clip 132

(Figures 1 to 3, 7 and 19) includes an annular split ring which may be expanded and mounted around the exterior surface of the double ball mounting bracket cylinder as shown in Figures 1 and 2. When mounted on the bracket 11, the female plug 134 is positioned for convenient attachment to the male plug 136 from the vehicle and yet is substantially hidden behind the rearview mirror assembly such that the electrical connection is substantially hidden from the passenger and driver side of the rearview mirror/vehicle lighting assembly.

As shown in Figure 19, the typical 12 volt DC power source in a modern vehicle is adapted to be connected via wires 140, 142 to two different terminals on switch 120. A ground connection is provided by wire 144 to one terminal of one of the bulb bases 80 and bulbs 98. That ground connection is continued to one terminal on the other bulb base by wire 146, while the second terminal on that other bulb base is connected to the third terminal on the switch and is, in turn, connected to the second terminal on the first bulb base by wire 148. Accordingly, as shown in Figure 19, when one terminal 136a of the male plug 136 is connected to a 12 volt DC power source from a door switch in a vehicle, the other power terminal 136b is connected to an unswitched 12 volt DC power source, and the centre terminal 136c is connected to ground, the rearview mirror/vehicle lighting assembly 10 may be operated either by throwing the rocker switch 120

to light both the bulbs 98 simultaneously for use in reading maps, books or the like within the car or will light automatically upon the opening of the vehicle doors for use as a courtesy light upon the entrance into the vehicle by a passenger or driver. As will be also understood from Figure 7, the wires 140 to 148, which extend between the lamp bases 80 and to the female plug 134, are easily received within the hollow connecting portion 48 between the lighting support portions 44, 46 of the lens housing 42 to conceal such wires from the exterior of the assembly 10. To provide egress for the wires from the interior of the lens housing 42, a small recess or notch 149 is provided immediately below the position of the mirror assembly mounting bracket 11, and is centred in the lens housing 42 (Figures 7 and 8). The three wires 140, 142, 144 can then exit the lens housing to connect to the plug 132 while the bulk of the wiring is concealed within the lens housing but protected from damage or electrical shorting by its encasement within the lens housing.

Referring now to Figures 15 to 18, the lens elements 150 are shown. Each lens element 150 is moulded from transparent, resinous thermoplastics material such as polycarbonate having a high temperature resistivity and high heat deflection temperature. A preferred material is LEXAN LS1-111 clear plastic obtained from General Electric Company, Lexan Products Division, Pittsfield, Massachusetts. As mentioned above, such polycarbonate material can

withstand temperatures of between 127°C and 138°C (260 degrees F. and 280 degrees F.) before deflecting. Since the temperatures in the present lighting assembly, even after an extended period of use, are not expected to reach above 38°C (100 degrees F.) above ambient temperature, such material will properly withstand with a wide safety margin the temperatures encountered.

Each lens element 150 has a planar, rectangular shape with a central section 152 including various optical surfaces on its upper and lower surfaces and a surrounding border 154 corresponding in size and shape to the lens opening recess 58 described above in connection with Figures 10 to 12. In addition, each lens element 150 includes a locating tab receiving recess 156 which receives locating tab 60 formed on one end of each lens opening 56 (Figure 10). Accordingly, when positioned in the bottom wall 52 of the lens housing 42 as shown in Figure 4, the recesses 156 are located at the inner ends of the lenses, and each lens element 150 has its optical surfaces oriented to direct the light downwardly and outwardly into selected areas for lighting of the vehicle passenger, driver and console areas, but substantially avoiding lighting of the instrument panel area, minimizing illumination of the crash pad over the instrument panel, and preventing distracting light which would otherwise hinder a driver's vision in th vehicle.

As shown in Figures 15 to 18, two sets of prisms

or optical surfaces, each forming Fresn l-type lens sections, ar provided on each lens element 150. A first set on the lower or underside of each lens element controls the lateral direction of the light from the bulbs 98. A second or upper set on the upper surface of each lens element, faces internally of the lighting assembly when the lens is mounted therein and controls the vertical direction of the light as it leaves the assembly. As shown in Figure 15, the first set of optical or lens surfaces extends transverse to the length of the overall lens and includes some 17 prisms or sections. Each prism section has its own draft angle and radius, as well as other prism dimensions which are shown in Figures 17 and 21. The preferred dimensions for prism sections A to J for one-half of the lens are set forth in table below. The right half of the lens 150 has prism sections which are mirror images of those on the left half and have identical dimensions to those noted in the table. With respect to the prism width dimension M (Figure 17), such prism width is the width minus the draft angle (such as draft angle 18 degrees for section F). As indicated by the dotted representative light rays in Figure 17, light from the bulb 98 passes downwardly through the lens 150 and is refracted or bent laterally outwardly by the prism sections A to J on both halves of the lens. Light passing through the centre of the lens is not bent, while light progressively farther from the centre is bent at progressively

greater angles toward the lateral outside ends of the rearview mirror/vehicle lighting assembly as well as laterally inwardly toward the centre of the assembly.

As shown in Figures 16 and 18, the upper or internal surface of the lens 150 has a series of 10 prism sections which extend at right angles to the prism sections A to J on the outer side of the lens. The upper lens prism sections are designed to bend light rays from the light source as shown by the representative, dotted light rays in Figure 18 progressively outwardly as they pass downwardly through the lens. Prism section 10 is closest to the instrument panel of the vehicle in assembly 10, while prism section 1 is farthest from the instrument panel. Hence, light rays are progressively bent or refracted outwardly on the side of the mirror assembly including the mirror element farther from the dashboard as one progresses from prism section 10 to prism section 1. Again, the preferred prism dimensions for each prism section 1 to 10 as shown in Figures 18 and 21 are set forth in the table reproduced below. As for prism width M in Figure 18, that prism width includes the draft angle unlike the prism width set forth in Figure 17 for the lower set of prism sections.

The prism dimensions are shown in Table 1 in millimeters and Table 2 shows the equivalent dimensions in inches for the upper and lower sets of optical surfaces or prism sections on each lens 150 in the preferred embodiment with reference to Figures 17, 18, 20 and 21 are as follows:

PREFERRED PRISM DEFINITION DATA

TABLE 1

	Prism Designation	Dim. M	Angle "A"	Chord Length	Chord Height	Prism Height	Radius	Dim. X	Dim. Y	Chord Angle
VERTICAL CONTROL PRISMS	1	1.270	16.000	1.755	0.124	1.262	2.852	2.812	1.494	46.0
	2	1.270	16.500	1.681	0.122	1.158	2.959	2.563	1.478	43.6
	3	1.270	18.00	1.615	0.127	1.059	2.614	2.240	1.346	41.0
	4	1.270	19.00	1.547	0.130	0.953	2.375	1.994	1.295	38.0
	5	1.279	20.00	1.488	0.132	0.853	2.177	1.783	1.247	35.0
	6	1.270	21.50	1.430	0.135	0.747	1.951	1.557	1.173	31.5
	7	1.270	22.50	1.374	0.137	0.635	1.796	1.377	1.153	27.5
	8	1.270	23.50	1.328	0.137	0.531	1.666	1.219	1.138	23.6
	9	1.270	23.50	1.285	0.135	0.409	1.613	1.080	1.199	18.6
	10	1.270	24.00	1.257	0.135	0.305	1.544	0.950	1.217	14.0
LATERAL CONTROL PRISMS	A	3.099	8.00	3.129	0.109	0.434	11.242	3.099	10.808	8.00
	B	1.511	6.75	1.633	0.048	0.617	6.947	3.536	6.076	22.20
	C	1.511	6.75	1.633	0.048	0.617	6.947	3.536	6.076	22.20
	D	1.270	22.50	1.542	0.152	0.874	2.104	1.689	1.097	34.50
	E	1.270	22.50	1.542	0.152	0.874	2.014	1.689	1.097	34.50
	F	1.270	22.50	1.542	0.152	0.874	2.104	1.689	1.097	34.50
	G	1.270	22.50	1.542	0.152	0.874	2.014	1.689	1.097	34.50
	H	1.168	17.50	1.402	0.107	0.772	2.329	1.811	1.466	33.40
	J	1.168	17.50	1.402	0.107	0.772	2.329	1.811	1.466	33.40

TABLE 2

	Prism Designation	Dim. M	Angle "A"	Chord Length	Chord Height	Prism Height	Radius	Dim. X	Dim. Y	Chord Angle
VERTICAL CONTROL PRISMS	1	.050	16.000	.0691	.0049	.0497	.1253	.1107	.0588	46.0
	2	.050	16.500	.0662	.0048	.0456	.1165	.1009	.0582	43.6
	3	.050	18.00	.0636	.0050	.0417	.1029	.0882	.0530	41.0
	4	.050	19.00	.0609	.0051	.0375	.0935	.0785	.0510	38.0
	5	.050	20.00	.0586	.0052	.0336	.0857	.0702	.0491	35.0
	6	.050	21.50	.0563	.0053	.0294	.0768	.0613	.0462	31.5
	7	.050	22.50	.0541	.0054	.0250	.0707	.0542	.0454	27.5
	8	.050	23.50	.0523	.0054	.0209	.0656	.0480	.0448	23.6
	9	.050	23.50	.0506	.0053	.0161	.0635	.0425	.0472	18.6
	10	.050	24.00	.0495	.0053	.0120	.0608	.0374	.0479	14.0
LATERAL CONTROL PRISMS	A	.1220	8.00	.1232	.0043	.0171	.4426	.1220	.4255	8.00
	B	.0595	6.75	.0643	.0019	.0243	.2735	.1392	.2392	22.20
	C	.0595	6.75	.0643	.0019	.0243	.2735	.1392	.2392	22.20
	D	.0500	22.50	.0607	.0060	.0344	.0793	.0665	.0432	34.50
	E	.0500	22.50	.0607	.0060	.0344	.0793	.0665	.0432	34.50
	F	.0500	22.50	.0607	.0060	.0344	.0793	.0665	.0432	34.50
	G	.0500	22.50	.0607	.0060	.0344	.0793	.0665	.0432	34.50
	H	.0460	17.50	.0552	.0042	.0304	.0917	.0713	.0577	33.40
	J	.0460	17.50	.0552	.0042	.0304	.0917	.0713	.0577	33.40

As will now be understood especially with reference to Figures 21 and 22, light emanating from the bulbs 98 and reflected downwardly from the inside surface of the reflector housings 100 passes downwardly through the lens elements 150. The light is refracted both outwardly toward the vehicle seats from a plane passing directly downwardly through the lenses as shown in Figure 22, laterally outwardly away from the ends of the assembly 10 to illuminate the driver and passenger front seats of the vehicle as shown in Figure 23, as well as laterally inwardly to overlap and illuminate the centre section between the seats or the "console" area between such seats along the centre line of the assembly as shown in Figure 22. With the lens elements positioned beneath the two light sources in the preferred embodiment of the present invention as shown in Figures 1 to 19, light is directed laterally outwardly approximately 45 degress from the centre line of the assembly as shown in Figure 22 such that both the driver and passenger front seats of the vehicle are illuminated with a predetermined moderate amount of light. Light rays directed inwardly by the opposite ends of the lens elements 150 at either position in the assembly overlap and create brighter illumination in the console

or centre area having a width of approximately 15 degrees on either side of a plane passing through the centre line of the assembly or 30 degrees in total for the console area as is also shown in Figure 22. At the same time, light is refracted back toward the front vehicle seats from the poisition of the rearview mirror/vehicle lighting assembly slightly below the windshield area of the vehicle at a typical angle of 60 degrees from the plane including the rearview mirror/vehicle lighting assembly as shown in Figure 21. This causes the light to illuminate substantially all of the lap area of the driver and front seat passengers but not the head or eye area of those passengers which would otherwise distract the vehicle driver or passengers. Similarly, minimal light is refracted toward the crash pad area of the vehicle atop the instrument panel, i.e., on the vehicle front side of the plane below the assembly as shown in Figure 21. Illumination of the generally vertical instrument panel is substantially avoided. A lesser amount of light is directed in the area between the plane passing downwardly through the assembly to the front edge of the front seats of the vehicle, or approximately 11 degrees in the typical situation as shown in Figure 22. Accordingly, the lens elements 150 combine to produce lighting in the desired

areas as shown in Figures 21 and 22 but do not illuminate undesired areas in the vehicle all with a substantially low amount of power from low wattage light sources.

As will now be apparent from Figure 1 to 4, 5, 7 and 9, the lighting assembly 40 including the lens housing 43 and associated lighting apparatus in lighting the support portions 44, 46 is designed to be removably secured to the back 16 of the mirror case 15. The assembly procedure includes positioning the lens housing 42 behind the back 16 of the mirror case 15 such that the end edges 92 of the retraining brackets 82 are placed inside the upper edges of the openings 30 on the case back 16. The lens housing 42 is moved relative to those edges of the openings 30 such that the edges are received between the upper edge 54 and the flange 90 of the brackets 82 as shown in Figure 9. Thereafter, the faces 67 of the walls 65 adjacent the lens openings 56 are positioned adjacent the outwardly facing edge of the bottom opening 32 such that the projecting bottom edge 70 of the lens housing engages the bottom edge 18 of the mirror case adjacent the opening 32. The lens housing is then moved inwardly such that the edge of the openings 32 engages those wall faces under the rib projections 64e, 66e and 68e in

tongue and groove fashion to lock the housing at such lower edges and also to prevent light leakage therethrough. Thereafter, sheet metal screws 160 (Figures 1 and 2) are placed through apertures 162 at either end of the lens housing 42 and inserted through spring metal clips 164 which are wrapped around the lateral edges of the openings 30 in regis try with the apertures 166 in the case back 16. The sheet metal screws 160 are then tightened against the clips 164 to pull the peripheral end edges 54 around the lens housing tightly into engagement with the contoured back 16 of the mirror case 15 around the periphery of the apertures 30, 32 to prevent light leakage from such apertures and to securely engage the lens housing with the back of the mirror. At the same time, the electrical wires 140, 142 and 144 leading to the female plug 134 are passed through the notch 149 at the top edge of the lens housing 42 and the retainer 132 is positioned around the mounting bracket 11 to hold the wires and plug in position for connection to the vehicle electrical system. It will thus be understood that the lens housing 42 is completely removable from the back of the mirror case for access to the lighting assemblies therein to change bulbs, replace reflector housings, repair

electrical connections or the switch 120 or remove the lens elements 150 as needed. At the same time, the access openings 30 extending through the back of the mirror case allow proper positioning of the lighting assemblies for downward direction of light through the openings 32, the lens openings 56 and the lens elements 150 as described above. when switched on, light is thus directed downwardly and outwardly from the assembly to the driver and passenger seat areas as well as the centre console area as shown in Figures 21 and 22 by the combined action of the reflector housings and the lens elements which direct light from the light sources.

As shown in Figures 23 to 26, a second embodiment 170 of the rearview mirror/vehicle lighting assembly is illustrated including a substantially similar day/night rearview mirror assembly to the rearview mirror assembly of the embodiment 10 including a double ball mounting bracket 11', a day/night pivot actuator 26' and a mirror case 15' all as described above in connection with embodiment 10 in Figures 1 to 22. The essential difference between embodiments 10 and 170 is the inclusion in embodiment 170 of two separate lighting assemblies 172, 174 received through separate openings 30' in case back 16' not one continuous lighting assembly 40 as in embodiment 10.

As shown in Figures 24 and 25, the lighting assemblies 172, 174 differ slightly from one another. Each includes a generally L-shaped moulded housing or cover also formed from higher temperature resistant polycarbonate and having a rectangular back wall 176, 178 and a rectangular bottom wall 180, 182 extending

generally at right angles from the respective back wall and continuously therefrom. The bottom walls 180, 182 include light directing openings 184, 186 which are segmented by transversely extending moulded cross bars 188, 190 which prevent the insertion of a finger into the lighting assembly to prevent contact with the hot light source. Each housing also has sidewalls 185, 187 and 189, 191 which are contoured to the shape of and have edge surfaces engaging the back 16' of the mirror case around the cut out openings 30', 32' to prevent light leakage.

As will also be understood from Figures 24 and 25, the upper edges of the back wall of the housings 176, 178 each include a U-shaped flange 192, 194 adapted to receive and engage in tongue and groove fashion the upper edge of the openings 30' in the case back 16'. The flanges 192, 194 (Figure 25) extend along substantially the entire length of the upper edges of the back walls 176, 178 of the separate housings to securely engage the edge openings and prevent light leakage when the housing is positioned thereover. Likewise, on either side edge of each housing are moulded U-shaped flanges or tabs 196a and b (Figures 25 and 26). These moulded tabs or flanges are also U-shaped and engage the side edge of openings 30' to retain the sides of the housings tightly thereagainst. For assembly, the housings are placed adjacent the openings 30' with the tabs 196a, 196b, 198a, 198b received through edge recesses 33' in the openings 30' (Figure 25), after which the housings are

slid upwardly to engage the flanges 192, 194 and position the U-shaped tabs 196, 198 over the cut out edges when the bottom walls 180, 182 are firmly in e with the bottom edge of the mirror case. While the assemblies 172, 174 are removable in the embodiment 170 to allow bulb replacement or other repair or maintenance, it is possible to permanently fix the housings in place with adhesives or the like in which case the openings 184, 186 would be made large enough to allow bulbs 98' to be changed.

Mounted internally within each assembly 172, 174 is a downwardly opening, generally U-shaped, metal, light housing 200, 202 (Figures 24 and 25). The metal housings 200, 202 have polished or reflective inside surfaces and serve as reflector housings and heat sinks as do reflector housings 100 in embodiment 10. However, metal housings 200, 202 are slightly different from one another because the assembly 172 includes a female plug for connecting electrical energy to the assembly while the assembly 174 includes a switch for operating the entire assembly. Each housing 200, 202 includes an upper base 204, 206 from which extend downwardly back walls 208, 210 and front walls 212, 214. On either end of the metal housings are end flaps 216 218 bent laterally from the edges of either the front or back walls after being stamped in one piece with the sheet metal of the housing before forming. In essence then, metal housings 200, 202 form box-like structures having no bottom wall such that light can project downwardly therefrom and be reflected by the inside surfaces of the metal housings after formation.

Each housing 200, 202 is attached by its back wall 208, 210 to the inside of the back housing walls 176, 178 via a moulded protrusion 220 (Figure 24). The protrusion 220 extends through an aperture in the metal housing back wall and is heat staked or ultrasonically formed to hold the housing in place with its bottom opening directly positioned above the opening 184 and 186 in the bottom wall 180 or 182 of the covers. Mounted within each metal housing 220, 202 is a lamp base and bulb assembly 80', 98' substantially similar to those described above and in connection with embodiment 10. The bulbs are centred within the housings so as to provide heat dissipation space therearound for cooling purposes. The bulb bases 80' are mounted to extend downwardly from the upper bases 204, 206 of the metal housings and project generally at right angles to the back of the mirror element and support the bulbs 98' extending downwardly therefrom. When the bulbs 98' are inserted in the sockets 80', the bulbs extend perpendicularly to the plane of the openings 184, 186.

As shown in Figures 23 to 25, a female plug receptacle 221 is mounted on the inside surface of the back wall 208 of the metal housing 200 such that it projects through apertures in the back wall 176 of the housing to receive a male connecting plug 222 (Figure 23) from the vehicle electrical system. A slide switch 223 is mounted on the back wall 210 of the metal housing 202. The switch 223 has its operating member 224 projecting through the metal back wall 210 and the back wall 178 of the housing cover for operation of both light assemblies from the rear of the overall assembly.

As will now be understood, in embodiment 170, the edges of the housings 172, 174 are tightly engaged around the periphery of the openings 30', 32'. Light is projected downwardly from the bulbs 98' through the openings at the bottom of the metal housings 200, 202 and through the openings 184, 186 in the bottom walls of the housing covers. The bottom openings 32' in the case 15' themselves help direct the light from the bulbs 98'. In certain embodiments of the invention, the bottom walls 180, 182 can be eliminated such that the openings 32' would alone direct the light. In embodiment 170, the bottom wall openings 184, 186 also direct the light. Such light from the bulbs projects downwardly beneath the assembly, laterally outwardly toward the ends of the assembly, inwardly toward the centre of the assembly as well as outwardly at an angle below the assembly. The direction of light is less extensive than in embodiment 10 where lenses are used. The wiring in embodiment 170 is essentially connected as in Figure 19 with switching occurring either by the opening of the doors in the vehicle or the use of the switch 223 as described above.

It is also apparent that assemblies 10 or 170 may include different types of light sources such as florescent bulbs, higher wattage incandescent bulbs, or multiple bulbs of the desired type in multiple sockets on either side f the centre line of the assembly. By modifying the optical surfaces on the lens elements in embodiment 10, lighting in specific areas can be adjusted when using any of these bulb combinations. Similarly, different locations and apparatus for connecting vehicle electrical power to

the rearview mirror/vehicle lighting assembly other than the plugs 130, 220 may be included, while the lens housings 42, 172, 174 may be adapted and contoured to different shaped rearview mirror assemblies as desired.

CLAIMS.

1. A rearview mirror vehicle lighting assembly (10; 170) comprising: a mirror case (15, 15') for a mirror (24) and means (14) for supporting the assembly in a vehicle, the case having a front opening through which the mirror element is visible; and a light source (98; 98'); characterised in that the case back (16, 16') comprises an opening therethrough; the bottom edge (18) of the case comprises an opening therethrough; and the assembly includes closure means (44) for covering the opening through the case back and housing means for supporting the light source within the case in a position to provide light shining downwardly and out the bottom edge of the case.

2. An assembly as claimed in Claim 1 in which the closure means is a housing secured on the case back, the housing being hollow, having a rear wall spaced from the case back, and tightly engaging the exterior of the mirror case around the periphery of the openings in the case back and the bottom edge to prevent light leakage therebetween.

3. A rearview mirror vehicle lighting assembly (10, 170) comprising: means for supporting the assembly in a vehicle; lighting means (40, 172, 174) for illuminating areas adjacent the assembly; and a mirror case (15, 15') with a back (16) for a mirror (24) characterised in the case back (16) being spaced from the mirror element and having at least one opening

therethrough into the spaces between the mirror element and the case back; housing means (44, 46) secured on the exterior of the mirror case for supporting the lighting means within the space through the opening in the case back, the housing means including closure means for covering the opening in the case back; and light directing means (42) for directing the light from the lighting means outwardly of the assembly.

4. An assembly as claimed in any one of the preceding claims in which the closure means comprises a light directing lens (42) positioned beneath the light source (98), and reflector means (100, 200) extending around the light source for reflecting light therefrom downwardly toward the lens.

5. An assembly as claimed in Claim 4 in which the reflector means is a metal housing which reflects light from the light source and also serves as a heat sink to dissipate heat from the light source.

6. An assembly as claimed in Claim 4 or 5 in which the reflector means comprises means engaging the housing means preventing shifting of the reflector means when positioned in the assembly.

7. An assembly as claimed in any one of the preceding claims in which the case back comprises a pair of openings therethrough, one on either side of the centre of the case back; the housing means comprising means for supporting lighting means within

both the openings and closure means for covering both the openings.

8. An assembly as claimed in any one of the preceding claims in which there are light directing means comprising means for directing light from the lighting means downwardly of the assembly, toward the side of the assembly comprising the mirror laterally outwardly of the ends of the assembly and laterally inwardly toward a plane extending through the centre of the assembly, the light directing means causing illumination of a first magnitude of first and second areas below and adjacent either lateral end of the assembly and on the one side of the assembly comprising the mirror and illumination of a second and greater magnitude than the first magnitude of a third area intermediate the first and second areas and on the one side of the assembly, but minimizing illumination of areas on the side of the case back which is opposite the one side.

9. A rearview mirror vehicle lighting assembly (10, 170) comprising: a mirror case (15, 15') for a mirror (24), a case back (16), lateral ends (19, 20), and means for supporting the assembly in a vehicle; lighting means (40, 172, 174) for illuminating areas adjacent the assembly; characterised by support means (44, 46) for supporting the lighting means on the mirror case; and light directing means (42) for directing light from the lighting means to illuminate first and second areas below, adjacent either lateral end, and on the one side of the assembly on which the

mirror element is located with a first amount of light, and a third area intermediate the first and second areas and aligned centrally of and on the one side of the assembly with a second amount of light which is greater than the first amount, the light directing means generally minimizing illumination of areas on the side opposite the one side of the assembly where the case back is located.

10. An assembly as claimed in Claim 9 in which the light directing means comprises means for directing a greater amount of light in the first, second and third areas (as defined in Claim 9) in a position spaced outwardly away from the one side of the assembly than in a direction directly downwardly from the assembly.

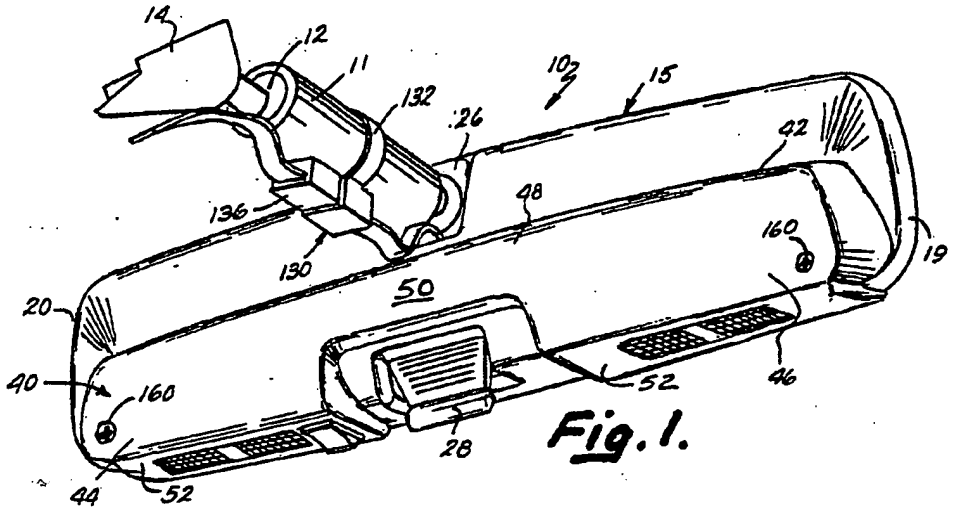

Fig. 1.

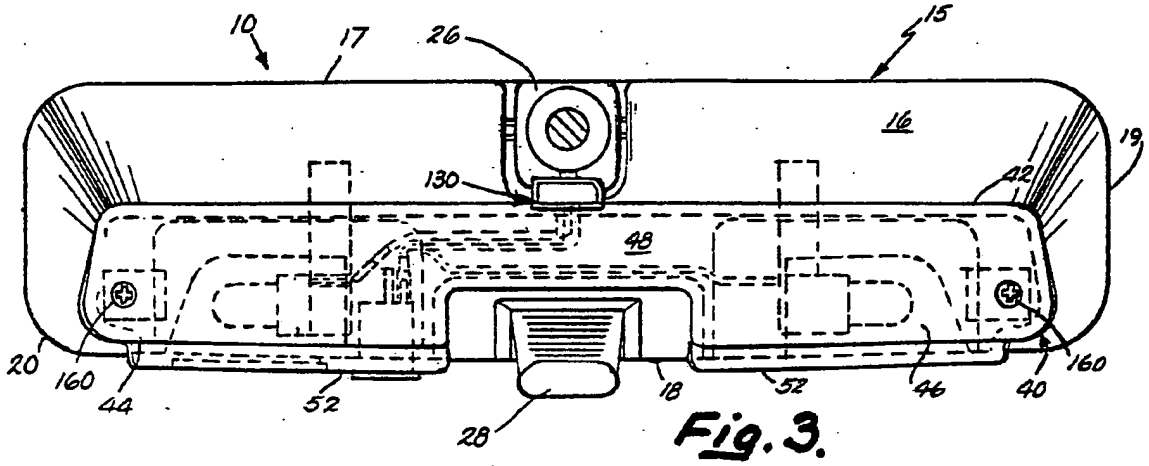

Fig. 3.

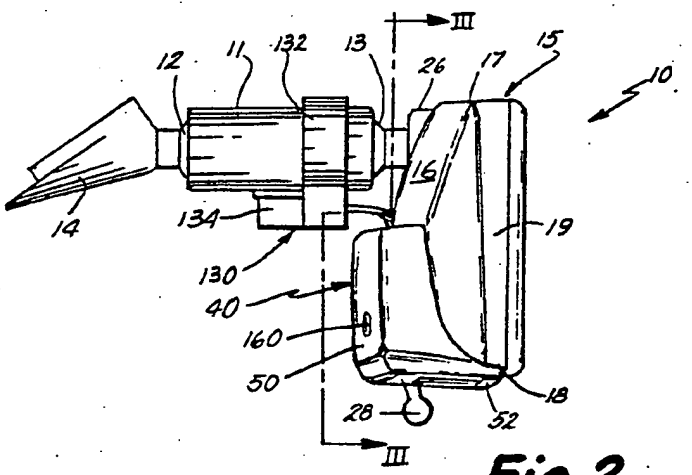

Fig. 2.

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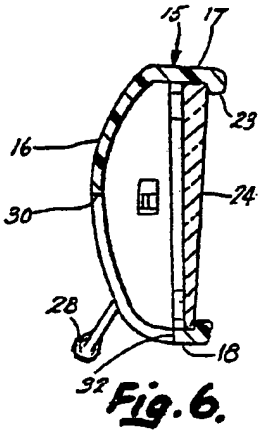


Fig.6.

Fig.4.

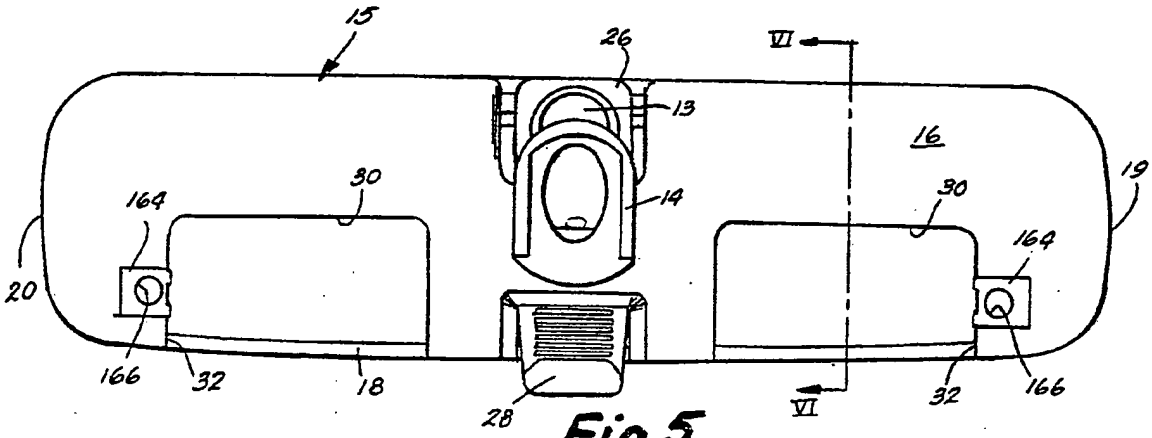


Fig.5.

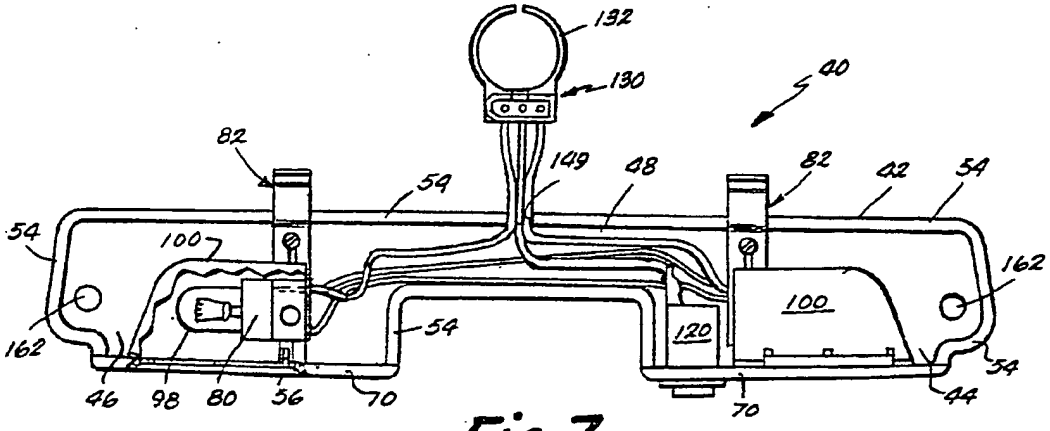


Fig.7.

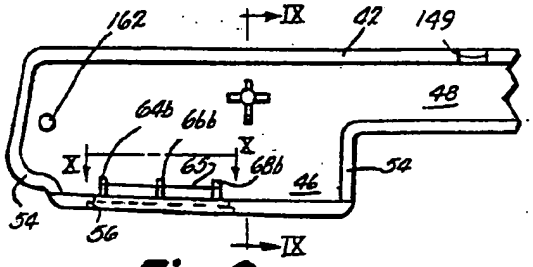


Fig.8.

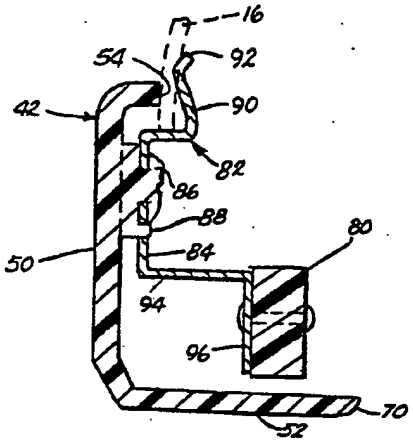


Fig.9.

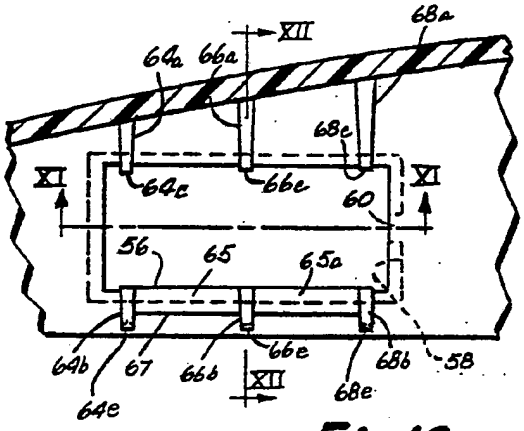
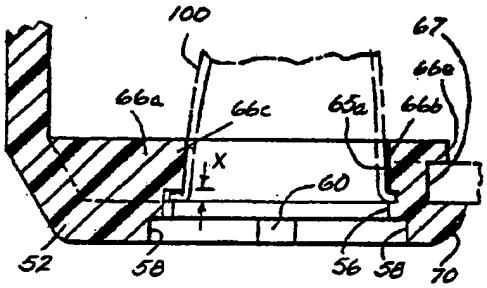


Fig.10



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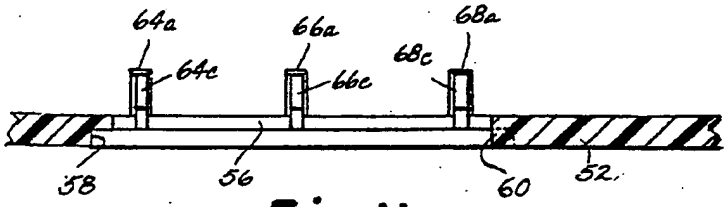


Fig. 11

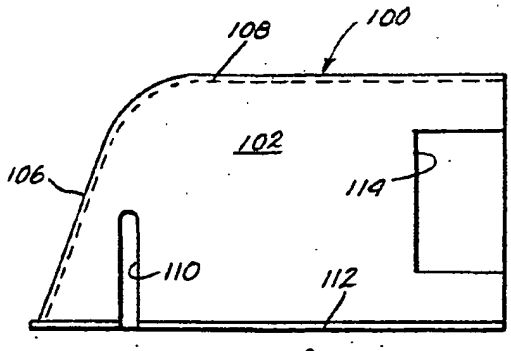
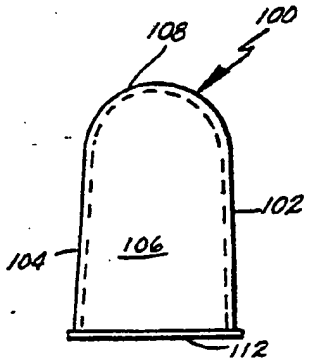


Fig.13.



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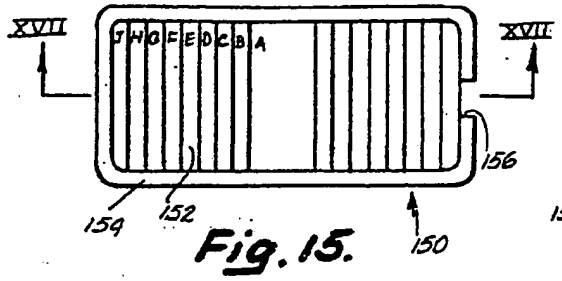

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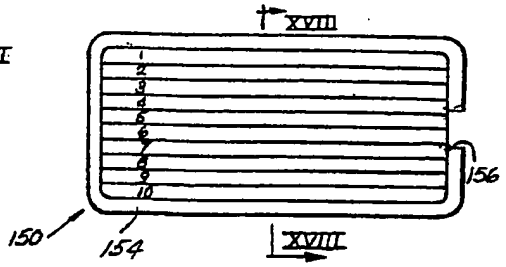
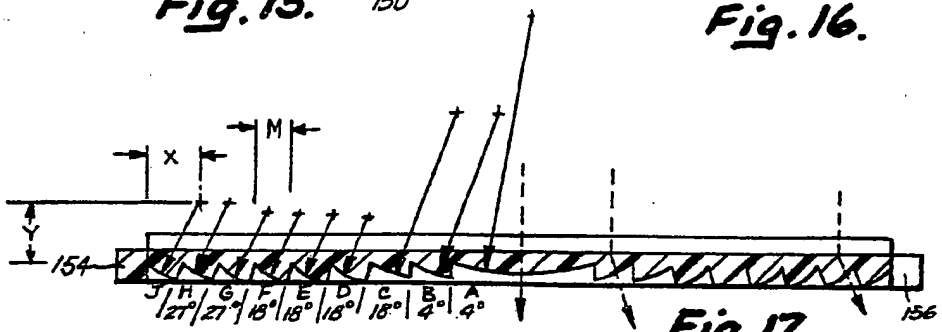


Fig. 16.



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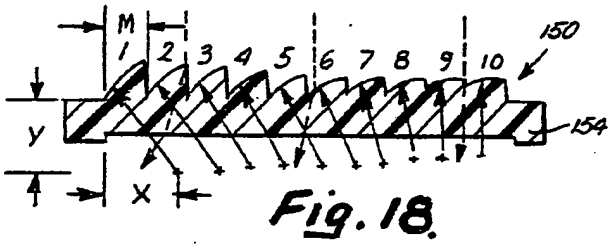
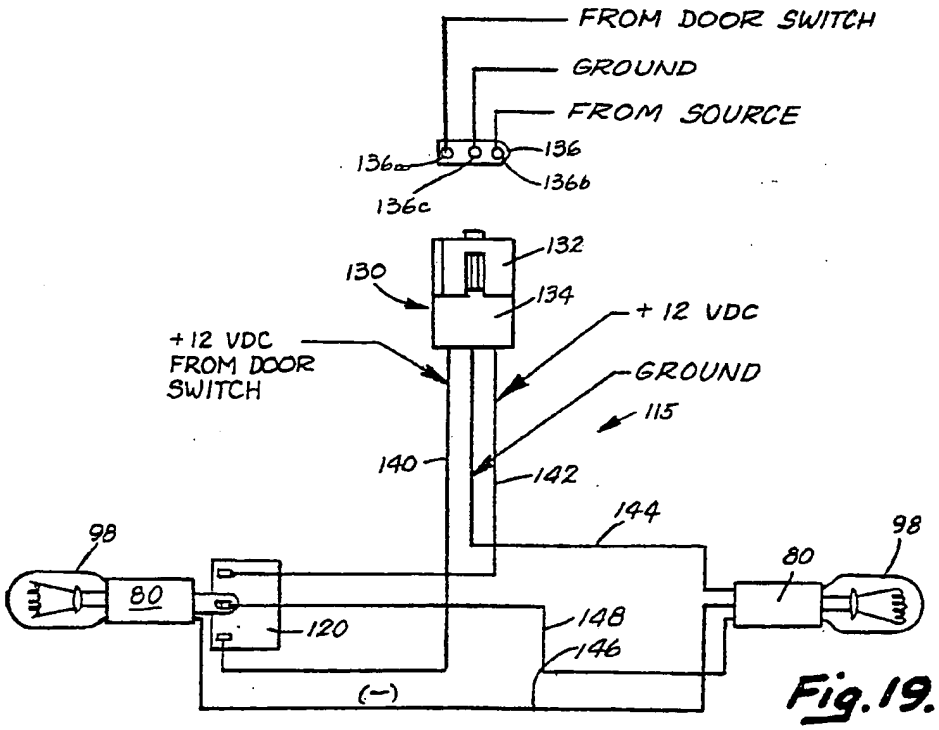


Fig. 18.



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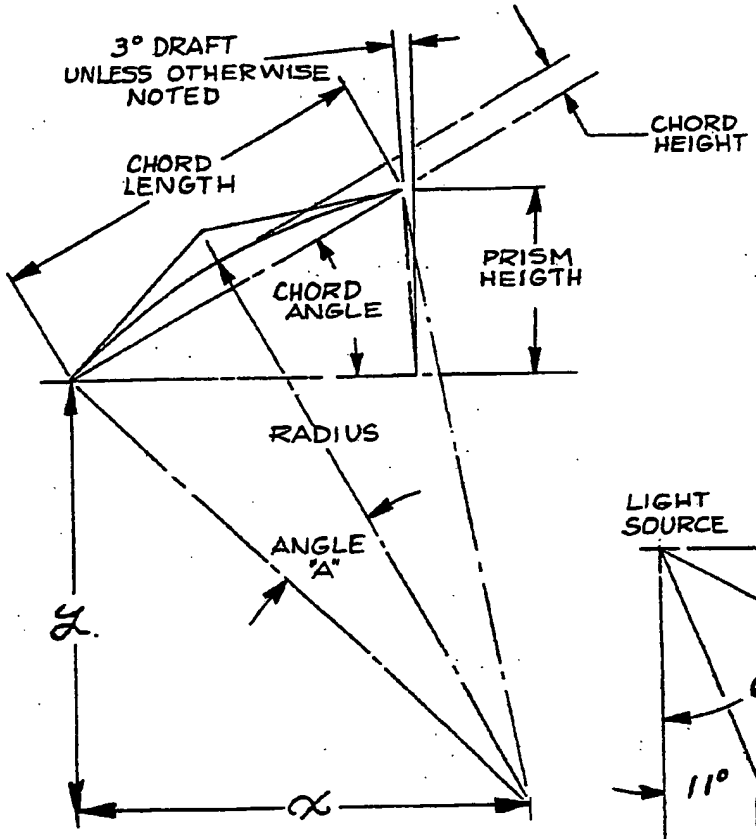

Fig. 20.

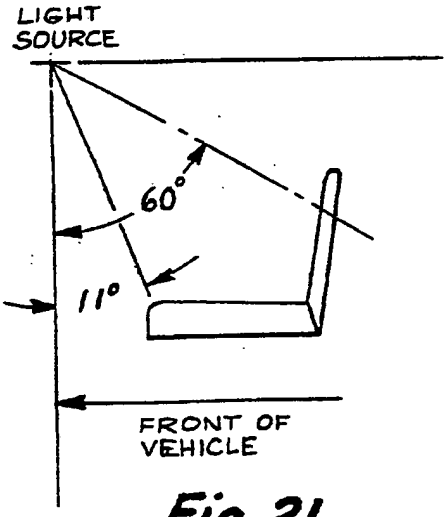

Fig. 21.

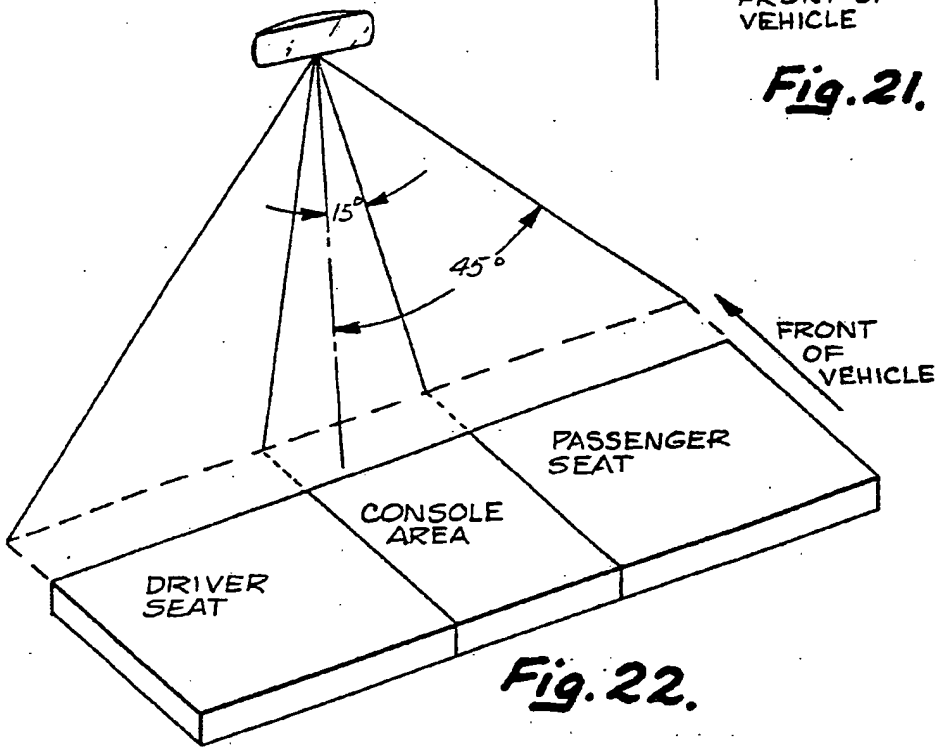

Fig. 22.

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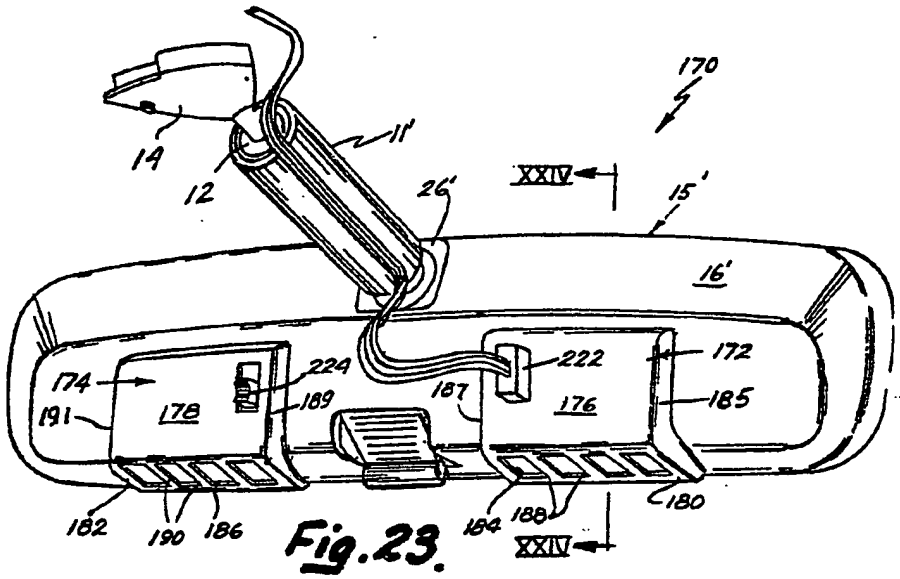

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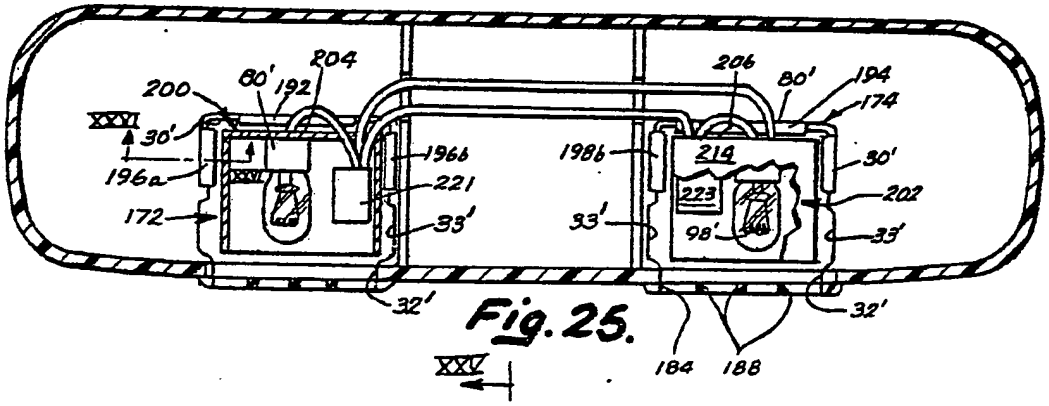

Fig. 25.

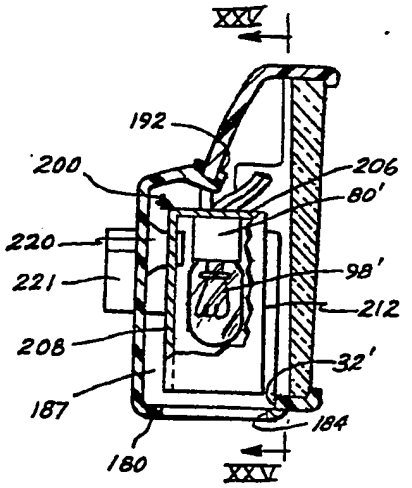

Fig. 24.

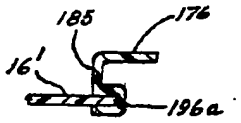

Fig. 26.